**Template | Unit Enhancement**

***ENGINEERING DESIGN***

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**Background Information**

**Instructional Materials Title: Circuits and Pathways**

**Publication Date: August 23, 2013**

**Work Group Participants: Dana Bogel, Joy Burke, Harry Whitikar, MaryMargaret Welch**

**Date Developed: 8/22/2013**

**High Leverage Lesson (Title and Page Number): Burglar Alarm**

**Rationale**

· **Why we identified this particular lesson: uses available materials, involves many types of energy transformation**

**- Connections to NGSS and WA Science Standards: 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3, 4-PS3-4, 4-PS4-3, 4-5 PS3E**

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***Engineering* Lesson Enhancement**

**Overview**

· **Additional engineering project after the unit**

· **Key instructional strategies and tools needed**

**Part 1: Lesson Modifications to Lead Up to *Engineering Task***

New lesson, not a modification

**Part 2: *Engineering* Learning Sequence**

Present the problem: we need a way to indicate unwanted access to our binders. Flesh it out with the students, defining the problem and it’s criteria for success (alarm is set off when binder is open and silent when closed) and constraints for the solution(s) (materials, time, must be a stand-alone system). Present additional constraints not defined by students, e.g. materials and time constraints.

**Part 3-A: Engineering Task**

1. Review learned skills in circuitry: switch construction, circuit construction, parallel and series circuits, open and closed circuits.
2. Teacher provides students with predetermined materials: 1 binder per group, light bulb w/ holder, D-Cell w/ holder, switch materials (paper clip, 2 brads, tag board) or previously prepared switches, copper wires
3. Students build alarms within given constraints.
4. Initial optimization through gallery walk
5. Menu of extension: additional alarm modes (additional light, sound production), durability, usability, fewer materials
6. Debrief: What was the problem addressed by our designs? What prior knowledge from our unit did we use to design an alarm system? What challenges or constraints did you encounter in the design process? How did you respond to them? What are some ways you could improve your alarm system?

**Part 3-B: Assessment Rubric**

**Design Self Assessment:**

List 2-3 problems that you ran into while building your alarm. Why were they a problem and what did you have to change to make it work?

Use “Circuits and Pathways” vocabulary to answer your question.

Note: Guide students away from listing environmental and/or interpersonal problems. Assessment should reflect problems with using *materials* to design the complete circuit.

**Assessment Rubric**:

**Meets Standard:** Student’s explanation includes a detailed, thorough description of each problem using the following criteria:

* Student’s writing is clear, allowing readers to understand the problem.
* Student accurately uses science vocabulary.
* Student explains the step that was missing/not working and the scientific principle/concept behind the problem.

**Approaching Standard:**

* Student’s explanation is incomplete and/or missing accurate scientific concepts.
* Some science vocabulary is used.

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**Additional Information**

NOTES

· Disemburdening the curriculum: remove lessons 13, 15, and Light Lessons

- Resources that will be useful

- Scaffolds that students will use